



**KAMARAJ IAS ACADEMY**  
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# Ozone hole

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**Why is in news?** Large ozone hole detected over Antarctica: Is it a matter of concern?

## More about news:

Satellite measurements over Antarctica have detected a giant hole in the ozone layer.

The hole, which scientists call an "ozone-depleted area" was **26 million square kilometers** (10 million square miles) in size, **roughly three times the size of Brazil**.

The European Space Agency (ESA) **Copernicus Sentinel-5P satellite** made the recordings on September 16, 2023, as part of the EU's environmental monitoring program.

The ESA said this is **one of the biggest ozone holes** they've ever seen.

The satellite measured trace gases in the atmosphere in order to monitor the ozone and climate. It showed that this year's ozone hole started earlier than usual, and had a big extension.

Experts believe the hole in the ozone is not likely to increase warming on the surface of Antarctica. "It's not a concern for climate change".

## What caused the giant ozone hole this year?

Scientists believe this year's big ozone hole could be **due to the volcanic eruptions** at Hunga Tongain Tonga during December 2022 and January 2023.

Under normal conditions, **gas released from a volcanic eruption** stays below the level of the stratosphere, but this eruption sent a lot of water vapour into the stratosphere.

The water had an impact on the ozone layer through chemical reactions and changed its heating rate. The water vapour also contained other elements that can deplete ozone like bromine and iodine. **There isn't much evidence the ozone hole is due to humans.**

The ozone hole opens up **because of the rotation of the Earth** causing **specials winds** over the closed landmass of Antarctica. "The winds **create a mini climate**, creating a shield over Antarctica preventing it from mixing with surrounding air. When the winds die down, the hole closes".

## Is climate change reopening ozone holes?

Scientists agree that ozone depletion is **not a principal cause** of global climate change.

However, there are signs that rising global temperatures could be having an impact on ozone holes. "Our mitigation of the ozone hole was working well since the 1980s, but in 2020 we were taken by surprise when the 2020 ozone hole was very deep and long lasting".

**Kamaraj IAS Academy**

Plot A P.127, AF block, 6 th street, 11th Main Rd, Shanthi Colony, Anna Nagar, Chennai, Tamil Nadu 600040

Phone: **044 4353 9988 / 98403 94477 / Whatsapp : 09710729833**

The same was true for 2021. Research showed that the main reason for the large ozone hole in 2020 was due to the **wildfires in southeastern Australia** that year.

The climate crisis carries on, with the Earth continuing to warm, fires are getting more common and more devastating around the globe.

It's been an **amazing bad year for boreal fires** in the Northern Hemisphere this year. If that continues to happen, we get more smoke injected into the stratosphere, and we might get more ozone depletion coming back.

It's **less clear what impact ozone holes have on the Earth's climate**. Some data shows that ozone holes actually contribute to cooling effects, as they reduce the greenhouse gas effect.

### **Ozone layer:**

Ozone holes grow and shrink every year

The ozone layer is a **trace gas in the stratosphere**, one of the four layers of the Earth's atmosphere.

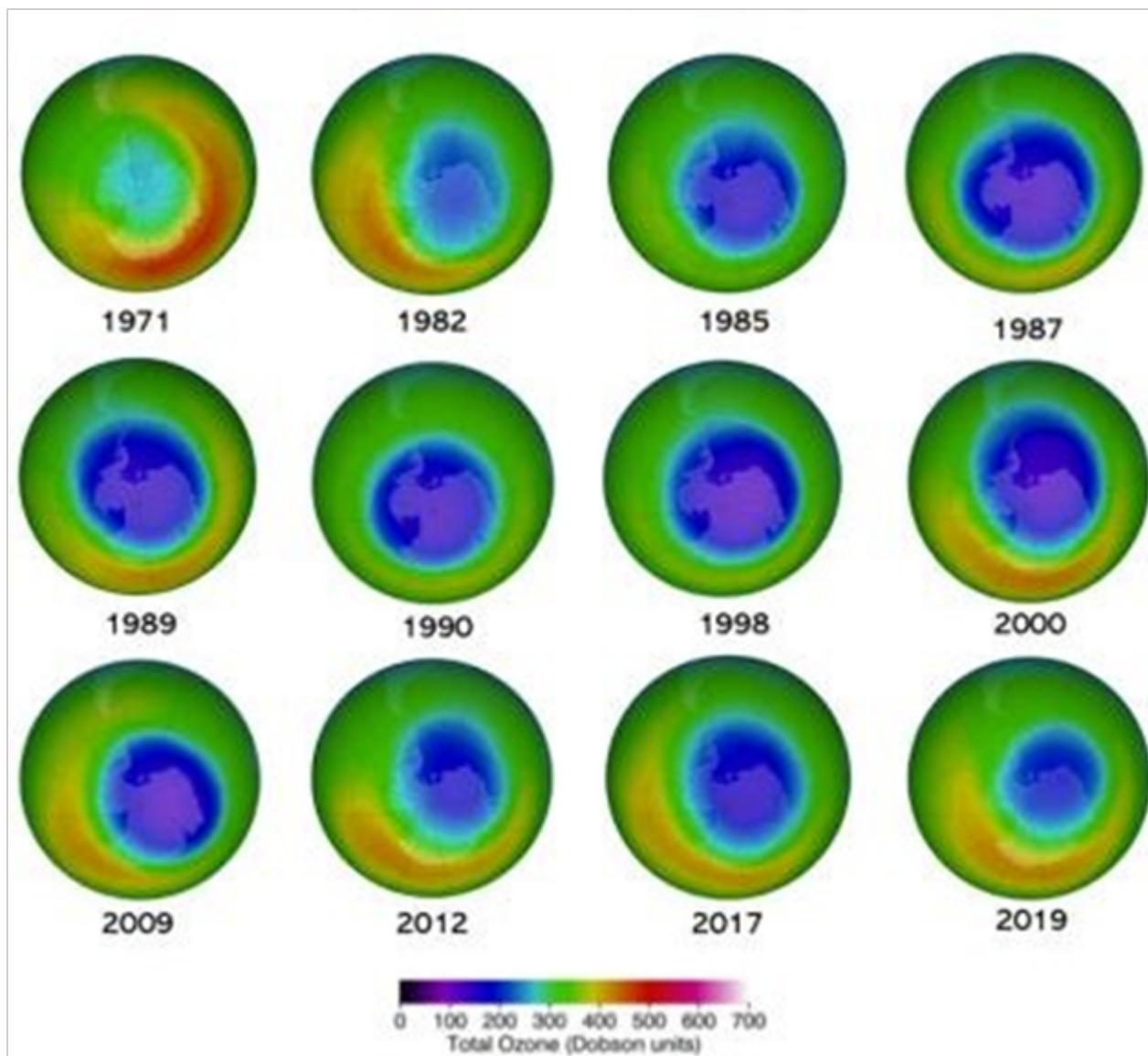
It functions as a **protective gas shield** that absorbs ultraviolet radiation, protecting humans and ecosystems from dangerous amounts of UV.

Most skin cancers are caused by exposure to high amounts of UV radiation, so anything that shields us from UV rays helps reduce cancer rates.

The **size of the ozone hole over Antarctica fluctuates each year**, opening each year in August and closing again in November or December.

**Ozone layer depletion** refers to the thinning of the protective ozone layer in the atmosphere.

Chemical compounds that cause ozone layer depletion are called **Ozone Depleting Substances (ODSs)**. Examples of ODSs are chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), carbon tetrachloride, methyl chloroform, hydrobromofluorocarbons, halons, etc.



### Global Initiatives for Tackling Ozone Layer Depletion:

The **1985 Vienna Convention for the Protection of the Ozone Layer** was an international agreement in which United Nations members recognized the fundamental importance of preventing damage to the stratospheric ozone layer. **India became a Party to the Vienna Convention for the Protection of the Ozone Layer in 1991.**

The **1987 Montreal Protocol on Substances that deplete the Ozone Layer** and its succeeding amendments were subsequently negotiated to **control the consumption and production of anthropogenic (ODSs) and some hydrofluorocarbons (HFCs).** India became Party to the Montreal Protocol in 1992.

The adoption of the **2016 Kigali Amendment to the Montreal Protocol** will **phase down the production and consumption of some HFCs** and avoid much of the projected global increase and associated climate change.

**EU legislation on ozone-depleting substances is among the strictest and most advanced** in the world. Through a series of regulations, the EU has not only implemented the Montreal Protocol but has often phased out dangerous substances faster than required.

The **EU Ozone Regulation** sets licensing requirements for all exports and imports of ozone-depleting substances and regulates and monitors not only substances covered by the Montreal Protocol (over 90 chemicals), but also some that are not covered (five additional chemicals called 'new substances').

## **Effects of Ozone Depletion:**

It increased level of UV radiation and causes diseases like carcinoma, melanoma, etc. Also causes sunburns, cataracts, aging or also to a weak immune system

The increased tropospheric ozone leads to health issues.

Animals can also suffer from skin cancer and additional diseases caused by UVB radiation.

If **increased vitamin D production**, can cause severe health conditions and can also increase the probability of mortality.

It can **alter sources and sinks of greenhouse gases** and thus can indirectly contribute to the global warming issue.

It can **harm the growth of plankton**. A decrease in plankton will therefore lead to a disruption of the whole marine food chain.

It can have an adverse effect on the growth of plants. The UVB radiation is known to be able to change parts of the plant's DNA. This may lead to reduced crop yields or other issues related to it.

Without ozone layer, the whole food chain would collapse within a few days or weeks.

It lowers the crop yields and other harmful effects is likely to imply serious financial downsides on a global scale.

## **Way Ahead:**

Ensuring that existing **restrictions on ozone-depleting substances** are properly implemented and global use of ozone-depleting substances continue to be reduced.

Ensure that banks of ozone-depleting substances (both in storage and contained in existing equipment) are dealt with in an **environmentally-friendly manner** and are replaced with climate-friendly alternatives.

Ensure that permitted uses of ozone-depleting substances are **not diverted to illegal uses**.

Reduce use of ozone-depleting substances in applications that are not considered as consumption under the Montreal Protocol.

Ensuring that no new chemicals or technologies emerge that could pose new threats to the ozone layer (e.g. very short-lived substances).